

A new earthworm (Ocneroдрilidae, Oligochaeta) from a Brazilian cave and considerations about *Belladrilus*.

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A new earthworm (Ocneroдрilidae, Oligochaeta) from a Brazilian cave and considerations about *Belladrilus*. - *Belladrilus* (*B.*) *otarion*, n.sp. is described from a cave in São Paulo State, Brazil. The excess of partner's spermatozoa is resorbed in the ental part of the spermathecal duct. The *Belladrilus* genus and its two subgenera (*Belladrilus* s.s. and *Santomesia*) are reevaluated. A key to *Belladrilus* species is presented.

Key-words: Oligochaeta - Ocneroдрilidae - *Belladrilus* - cave - Brazil.

INTRODUCTION

Interested in general cave fauna Dr. Eleonora Trajano (Depto. Zoology, University of São Paulo) collected some small earthworms in the Gruta dos Paiva (24°16' S-48°17' W), a cave in Iporanga Municipality, São Paulo State, Brazil, at February 2, 1989. The cave is located in a calcareous area, it is longer than its known 2,880 m and is composed of a main gallery throughout traversed by the Lageado River and an upper dry gallery with several outwards openings. The earthworms were found in the very damp calcareous silty-arenaceous sediments that form the river edges inside the cave. The associated fauna, mainly arthropods, is listed by TRAJANO & GNASPINI-NETTO (1991). I thank to Dr. Trajano for the opportunity to study the earthworms.

The earthworms were studied by dissections, pieces mounted on microscope slides with glycerin-water (1:1) and serial microscopical sections, 10 µm, stained by Mallory's triple method (PANTIN, 1964). The sketches were made with camera lucida. The material is deposited in the Department of Zoology, University of São Paulo (ZU) and in the Museum d'Histoire Naturelle, Genève (MHNG).

Belladrilus (B.) otarion n.sp.

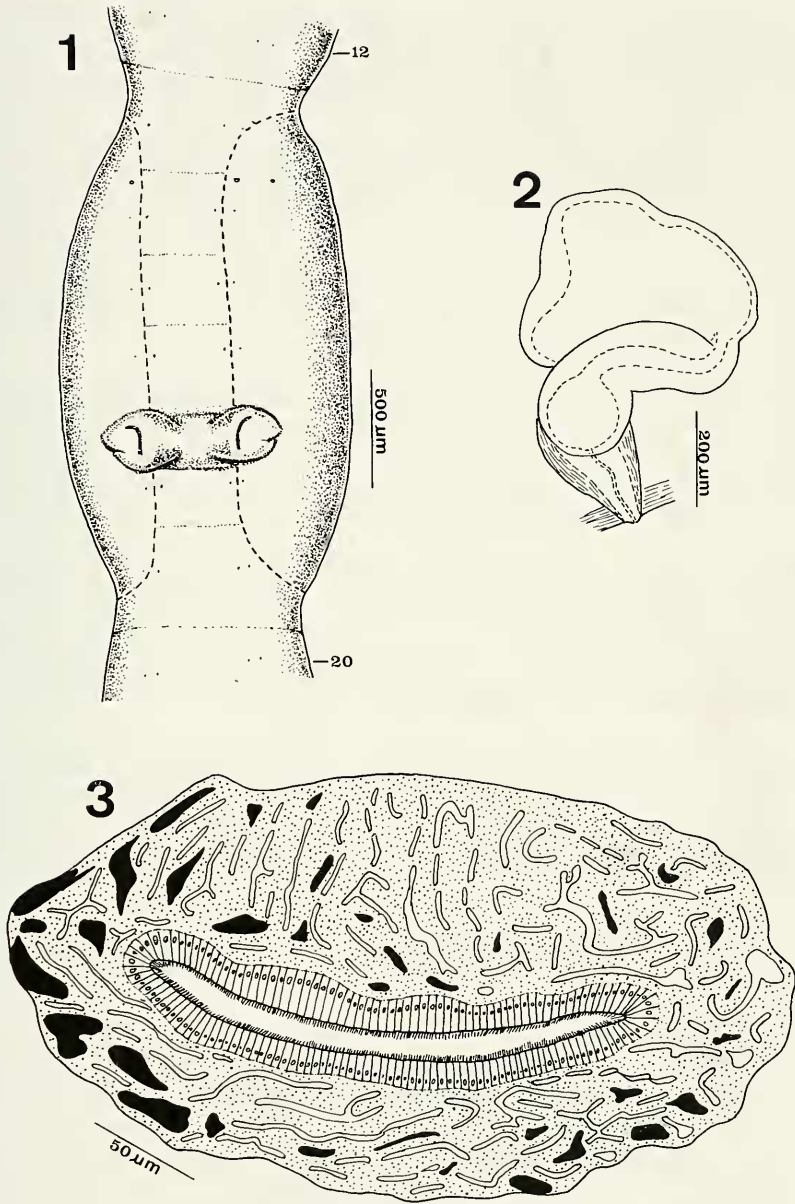
(Figs 1-3)

MATERIAL – Holotype: 1 clitellate specimen (ZU-1282A); paratypes: 2 clitellate specimens (MHNG-18880 INVE); 2 mature a clitellate and 2 young specimens (ZU-1282B).

DESCRIPTION – The length of the animals varies from 21-28 mm, the mid-body diameter from 0.9-1.0 mm and the number of segments from 65-72. They have not pigment. The prostomium is epilobous 1/3 of open tongue. There are not dorsal pores. There are 8 setae per segment beginning from II and disposed in 4 pairs of regular lengthwise series. The setal ratios in the middle body region (segments XXX-XL) are $aa : ab : bc : cd : dd = 5.7 : 1.0 : 5.7 : 1.0 : 19.0$ ($ab = 48 \mu\text{m}$). The mid-body setae are elongated sigmoid with distal nodule and unicuspidate apex of smooth surface without ornamentation. Their length varies from 112-128 μm ($M = 120 \mu\text{m}$), the longest ones are ventral. There are not differentiated genital setae; the mature animals have not the ventral setae of XVII. The clitellum extends on XIII-XIX (= 7 segments); it is saddle-shaped with the lower limit at ab . The tumid male genital field is ventral on 3/4 XVII-1/4 XVIII growing in angles at each side up to 1/3 bc . The male pores are in 17/18 on line b and the prostatic pores at 1/2 XVII a little lateral to b . The two pores of every side are connected by a seminal groove similar to an inverted L. The two areas of the male genital field containing the seminal grooves are prominent like two small ears with a lateral notch (Fig. 1). The female pores are anterior in XIV on line b . A pair of spermathecal pores is placed on small rounded papillae in 7/8, line b . Nephridiopores were not seen.

The septa 6/7-10/11 are thick and muscular, the septa 5/6 and 11/12 are a little less thick and the other septa are thin and fragile. Septal glands go up to VI. A rounded and strongly muscular gizzard lies in VII. There is a pair of thick tubular calciferous glands in IX; they originate from the lateral walls of the oesophagus close to septum 9/10 and go downwards and forwards to septum 8/9. Each gland has a large axial cavity and a thick wall (Fig. 3). The wall is composed by an intricate net of interconnected glandular canaliculi intermingled with blood spaces. The axial cavity is wide near to its opening into the oesophagus and becomes successively smaller towards the anterior end of the gland, where it receives the parietal glandular canaliculi. There is no other opening of the glandular canaliculi into the axial cavity. The wall of the axial cavity is formed by a high cylindrical ciliated epithelium without folds or trabeculae. The intestine begins in XII; caeca and typhlosolis are lacking. Two pairs of thick intestinal hearts are in X and XI. There is a pair of stomate avesculate nephridia per segment.

A pair of testes and iridescent male funnels lies in X, whose cavity is full of spermatozoa. There are two pairs of seminal vesicles in IX and XI; they have nodular surface and the first pair is somewhat smaller. The pair of male ducts proceed in a straight course laterally to the prostate duct to 17/18, where they pierce the body wall. The pair of prostate glands is in XVII; the glands are long and lie under the intestine being directed forwards to XII or backwards to XXVI. The duct of each gland is thin and muscular without ectal dilation and 2 1/2 segments long, it goes in a straight course forwards to XV or backwards to XIX. The transition from duct to glandular part is



FIGS 1-3

Belladrilus (B.) otarion: 1. Ventral view of the XII-XX segments. 2. Spermathecae (glycerin-water mounting). 3. Transverse section through the mid region of a calciferous gland.

sudden. The glandular part is tubular, 2-3 times wider than the corresponding duct, long and very sinuous. One pair of ovaries and female funnels are ventral in XIII; there are not ovisacs. One pair of spermathecae lies in VIII. They are S-bent formed by a long duct and a bulky pear-shaped ampulla. The duct is folded like an elbow with a dilation in the bend setting apart an ectal part from an ental one. The ectal part of the duct is almost half as long; its wall is thickly muscular and its thin lumen lacks spermatozoa. The dilation is simple, without seminal chambers and it may or may not have some spermatozoa. The ental part of the duct has a wide lumen filled with spermatozoa. Its wall is made up of large club-shaped cells of basal nucleus and homogeneously pale blue stained plasma with pieces of bright red stained spermatozoa in reabsorption. The ampulla, full of spermatozoa, has glandular walls.

DISCUSSION – *B. (B.) otarion* shares with *B. (B.) arua* the morphology of the seminal grooves and a similar morphology of spermathecae, with well differentiated duct and ampulla. The two species are distinguished by the following characteristics: *B. (B.) otarion*: male pores in 17/18 (*B. (B.) arua*: male pores in 1/2 XVIII); spermathecal pores in 7/8 (in 8/9); two pairs of seminal vesicles in IX and XI (one pair in XI).

ETYMOLOGY – The name of the new species refers to the shape of the male porophores in the plural genitive of the classical Greek word $\tau\omicron\ \omega\tau\alpha\rho\iota\omicron\nu$ = small ear.

CONSIDERATIONS ABOUT THE GENUS *Belladrilus*

The genus *Belladrilus* Righi includes originally two subgenera: *Belladrilus* s.s. and *Santomesia* Righi (1984a). Due to the discovery of *B. (B.) otarion*, with male pores in 17/18 and one pair of spermathecae in 7/8, the distinction between the two subgenera becomes restricted to the structure of the calciferous glands as emphasized in the key below.

KEY TO *Belladrilus* SPECIES (DISTRIBUTIONAL DATA AFTER RIGHI 1984A, B AND MISCHIS 1991)

1. Cavity of the calciferous glands with longitudinal trabeculae not coalescing in the gland axis or cavity simple, without trabecula. *Belladrilus* s.s. 2
 - Cavity of the calciferous glands divided by lengthwise trabeculae coalescing in the gland axis. (Prostate pores in 1/2 XVII and male pores in 17/18; spermathecal pores in 8/9, line *b*. Argentina: Santa Fe and Cordoba prov.) *Belladrilus (Santomesia) emiliani* Righi, 1984a
2. Prostate pores in 1/2 XVII and male pores in 1/2 XVIII; spermathecal pores in 8/9. 3
 - Prostate pores in 1/2 XVII and male pores in 17/18; spermathecal pores in 7/8, line *b*. (Brazil: São Paulo State). *B. (B.) otarion*, n.sp.
3. Spermathecal pores in line *b* (Brazil: Mato Grosso State). *B. (B.) pocaju* Righi, 1984a

- Spermathecal pores in line *c*. 4
- 4. Seminal grooves straight. Sac-like spermathecae without distinction between duct and ampulla (Argentina: Corrientes and Cordoba prov.). *B. (B.) jimi* Righi, 1984a
- Seminal grooves like an inverted L. Spermathecae with long duct folded in elbow and well separated egg-like ampulla (Brazil: Mato Grosso State). *B. (B.) arua* Righi, 1984b

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